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Yuichi Fujioka

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WENDEROTH, LIND & PONACK, L.L.P.

2033 K STREET N. W.

SUITE 800

WASHINGTON, DC 20006-1021

EXAMINER

MCCRACKEN, DANIEL

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/540,974	Applicant(s) FUJIOKA ET AL.	
	Examiner DANIEL C. MCCracken	Art Unit 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 June 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-35 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>6/27/2005, 9/27/2006, 10/17/2006</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Citation to the Specification will be in the following format: (S. # : ¶/L) where # denotes the page number and ¶/L denotes the paragraph number or line number. Citation to patent literature will be in the form (Inventor # : LL) where # is the column number and LL is the line number. Citation to the pre-grant publication literature will be in the following format (Inventor # : ¶) where # denotes the page number and ¶ denotes the paragraph number.

Specification

A substitute specification including the claims is required pursuant to 37 CFR 1.125(a) because the number of amendments to the specification needed to correct all of the deficiencies would make it difficult to consider the application. A substitute specification in proper idiomatic English and in compliance with 37 CFR 1.52(a) and (b) is required. The substitute specification filed must be accompanied by a statement that it contains no new matter. The Specification suffers from poor diction, syntax, and grammatical form, possibly from a machine translation from Japanese. For example, Applicants state:

As the carbon nanotube, there are a multi-layer nanotube having a multi-layer structure where a graphite sheet is closed in a cylindrical shape and a single-layer nanotube having a single layer structure where a graphite sheet is closed in a cylindrical shape. . . . Thereafter, researches for the multi-layer nanotube were positively made.

(S. 1: 12-21) (noting the questionable diction, syntax, and use of the passive voice). If this sentence reads well in Japanese, it does not read well in English. This example was taken from the first page of the specification. It goes without saying that many other examples of this “style”

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of writing (or lack thereof) can be found throughout the Specification. Applicants are on notice that the entire Specification is unacceptable, and a Specification with proper idiomatic English is expected. Furthermore, Applicants should correct the “A producing method of carbon nanofibers” in the claims to read in proper idiomatic English. The Examiner does not write his office actions in the following form: “Firstly, great misunderstanding and confusion is long felt by Examiner with un-proofreading machine translations freshly given.” Applicants are expected to extend the same courtesy.

A substitute specification must not contain new matter. The substitute specification must be submitted with markings showing all the changes relative to the immediate prior version of the specification of record. The text of any added subject matter must be shown by underlining the added text. The text of any deleted matter must be shown by strike-through except that double brackets placed before and after the deleted characters may be used to show deletion of five or fewer consecutive characters. The text of any deleted subject matter must be shown by being placed within double brackets if strike-through cannot be easily perceived. An accompanying clean version (without markings) and a statement that the substitute specification contains no new matter must also be supplied. Numbering the paragraphs of the specification of record is not considered a change that must be shown.

Information Disclosure Statement

The Examiner has considered the relevance of all foreign patent documents insofar as the translated abstract, search report, etc. indicates. “The duty of candor does not require that the applicant translate every foreign reference, but only that the applicant refrain from submitting

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partial translations and concise explanations that it knows will misdirect the examiner's attention from the reference's relevant teaching." *Semiconductor Energy Laboratory Co. v. Samsung Electronics Co.*, 204 F.3d 1368, 1378, 54 USPQ2d 1001 1008 (Fed. Cir. 2000).

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 4, 8, 11, 12, 15-16 and 26-27 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With respect to Claim 4, "calm" and "violent" are indefinite. Is this term meant to imply some sort of phenomena associated with fluid mechanics, or is it indicative of the "temperament" of the fluid? See above with respect to proper idiomatic English. In general, it is not entirely clear what is happening in this claim versus Claim 2. As to Claim 12, "S component" lacks antecedent basis and is indefinite. Claim 15 is rejected as prolix. *See* MPEP 2713.05(m). It is unclear which substances are added and what effect, if any, each is to have. As to Claim 16, "the additive" lacks antecedent basis. Which one are Applicants referring to? As to Claims 26-27, the addition of the word "type" renders the scope of the expression indefinite. In claims 8, and 11 (for example) 'kind' is unclear as to what else is encompassed.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The reference teaches each and every limitation of the rejected claims. The pinpoint citations are in no way to be construed as limitations of the teachings of the reference, but rather illustrative of particular instances where the teachings may be found.

Claims 1-6, 8-14, 19-30, and 32-35 are rejected under 35 U.S.C. 102(b) as being anticipated by US 6,413,487 to Resasco, et al. in view of US 5,618,875 to Baker to show a state of fact.¹

With respect to Claim 1, Resasco recites a method of producing carbon nanotubes. *See e.g.* (Resasco 3: 28 *et seq.*). “Fine particles” (i.e. catalysts) are employed, and the nanotubes grow on the catalyst. *See e.g.* (Resasco 4: 15-26). Nanotube recovery, including separation from the catalyst, is taught. *See e.g.* (Resasco 4: 40 *et seq.*). As to Claim 2, a “fluidized bed” process – which is being interpreted as the “fluidizing layer” – is taught. (Resasco 12: 47- 13: 42). As to Claim 3, the catalyst is fluidized and carbon nanotubes grow from the catalysts. *Id.* As to Claim 4 notwithstanding the ambiguities noted above, a fluidized bed is taught. *Id.* Whatever “calm” or “violent” stirring is being claimed is expected to be taught as Resasco discloses a fluidized bed. As to Claims 5-6, pure metal catalysts (i.e. those not on a porous support) are taught. (Resasco 8: 6-9). To the extent Claim 5 is meant to refer to the “closeness” of particles with respect to one

¹ Multiple reference 35 U.S.C. 102 rejections are proper when extra references are cited to explain the meaning of a term or show a characteristic not disclosed in the reference is inherent. *See* MPEP 2131.01 *et seq.*

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another in the bed, it is expected that this is disclosed by Resasco as, if the particles were not “closely packed,” then they would not be fluidized. As to Claim 8, silica, alumina and other zeolites are taught. (Resasco 7: 58-62). Note the percent of catalyst to zeolite taught. (Resasco 8: 1-5). As to Claim 9, any number of separation and recycle steps are taught. *See e.g.* (Resasco “Fig 4,” and accompanying text). As to Claim 10, this claim reads on a catalyst on a support, clearly taught by Resasco. (Resasco 7: 52 *et seq.*). As to Claim 11, any number of metals – including Group VIII (Co, Ni, Pt) are taught. (Resasco 7: 12 *et seq.*). As to Claim 12, notwithstanding the ambiguities noted in the rejections under 35 U.S.C. 112 *supra*, whatever an “S component” is, it is expected to be taught. *See Id.* As to Claim 13, “additive particles” are taught. (Resasco col. 7-8). The zeolites are different shapes than the metal particles. *Id.* As to Claim 14, “plural times” is being interpreted to mean growing a nanotube many times. Resasco makes mention of nanotube in the plural. *See e.g.* (Resasco 2: 47).

With respect to Claim 19, Resasco teaches reactors with heating means and catalyst recovery separation means. (Resasco “Figures 2-5,” 9: 1 *et seq.*). To the extent Resasco may not recite *in haec verba* a “heating apparatus,” it is expected to necessarily disclose one. Note that Resasco makes numerous mention of heating steps. *See e.g.* (Resasco 3: 65 *et seq.*, 7: 1 *et seq.*). This is the evidence offered to prove inherency. “[T]he PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his [or her] claimed product. Whether the rejection is based on inherency’ under 35 U.S.C. 102, on prima facie obviousness’ under 35 U.S.C. 103, jointly or alternatively, the burden of proof is the same...[footnote omitted].” The burden of proof is similar to that required with respect to product-by-process claims. In *re* Fitzgerald, 619 F.2d 67, 70, 205 USPQ 594, 596 (CCPA 1980)

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(quoting *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433-34 (CCPA 1977)). As to Claim 20, a fluidized bed reactor (i.e. the “fluidizing layer reaction apparatus”) is taught. *See e.g.* (Resasco 12: 47 *et seq.*). As to Claim 21, a “catalyst supplying apparatus” is taught. *See e.g.* (Resasco 9: 55 *et seq.*). As to Claim 22, a gas is considered a liquid, and as such, a fluidized bed reactor supplies the catalyst in the presence of a gas, or something in the “liquefied state.” *See* (Resasco 3: 65 *et seq.*) As to Claim 23-26, a “catalyst supplying apparatus” is taught. *See Id.* Note that “solid” catalysts are taught. (Resasco 7: 12 *et seq.*). See above with respect to the fluidized bed - as the bed is fluidized, it necessarily has a gas supplying apparatus. *See also* (Resasco “Figs. 2-5”). As to Claim 27, whatever is meant by a “kiln type” vessel, Resasco teaches it. (Resasco “Figs. 2-5”).

As to Claim 28, to the extent Resasco *may* not recite *in haec verba* the catalyst (i.e. “fine particle”) diameter, it is expected that the diameter is necessarily disclosed. It is well known that the diameter of carbon nanotubes/nanofibers is controlled by the diameter of the catalyst particle. This teaching is reflected in numerous places, for example US 5,618,875 to Baker, et al. *See* (Baker 5: 9-10) (“The catalyst particle size determines the diameter of the filament”) Baker, like Resasco, teaches the production of carbon nanofibers. *See* (Baker 3: 10 *et seq.*). Baker also teaches catalyst sizes of 25 Å (= 2.5 nm, *i.e.* within the claimed range). (Baker 5: 8). Therefore, it is expected that the catalysts (i.e. fine particles) as taught in the apparatus of Resasco have the same size as claimed. This is the evidence offered to prove inherency. “[T]he PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his [or her] claimed product. Whether the rejection is based on inherency’ under 35 U.S.C. 102, on prima facie obviousness’ under 35 U.S.C. 103, jointly or alternatively,

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the burden of proof is the same...[footnote omitted].” The burden of proof is similar to that required with respect to product-by-process claims. In *re* Fitzgerald, 619 F.2d 67, 70, 205 USPQ 594, 596 (CCPA 1980) (quoting In *re* Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433-34 (CCPA 1977)).

As to Claims 29-30, see discussion of Claims 5-6 *supra*. As to Claim 32, see discussion of Claim 8 *supra*. As to Claim 33, Resasco recites pressures above 0.01 MPa (Resasco 4: 10-15) and temperatures in the claimed range. (Resasco 7: 1-5). As to Claim 34, Resasco teaches a collision unit. *See e.g.* (Resasco “Fig. 2”) and (Resasco 9: 1 *et seq.*) Catalysts collide with any of the parts shown or disclosed. Therefore, a “collision unit” is taught. As to Claim 35, heat transfer is described. *Id.*

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

The references cited teach each and every limitation of the rejected claims. The pinpoint citations are in no way to be construed as limitations of the teachings of the reference, but rather illustrative of particular instances where the teachings may be found. As to the rejection under 35 U.S.C. §§ 102/103, where the applicant claims a composition in terms of a function, property or characteristic and the composition of the prior art is the same as that of the claim but the function is not explicitly disclosed by the reference, the Examiner may make a rejection under both 35 U.S.C. 102 and 103, expressed as a 102/103 rejection. See MPEP 2112 III. (discussing 102/103 rejections).

With respect to the third *Graham v. Deere* inquiry, resolving the level of ordinary skill in the art, the Examiner resolves the level of ordinary skill to be high. Skilled artisans in the carbon nanotube art tend to be PhD chemists or chemical engineers with industry or laboratory experience. Support for this finding can be found in any of the references of record, including those provided by Applicants on their IDS.

Claims 1-6, 8-14, 19-30, and 32-35 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over US 6,413,487 to Resasco, et al. in view of US 5,618,875 to Baker to show a state of fact.

The preceding discussion of Resasco and Baker accompanying the anticipation rejection *supra* is expressly incorporated herein by reference. See above with respect to 102/103 rejections.

Claims 7 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,413,487 to Resasco, et al. as applied to claims 1 and 19 above, and further in view of Ergun, et al., *Fluid Flow through Randomly Packed Columns and Fluidized Beds*, Ind. Eng. Chem. 1949; 41(6): 1179-1184 (hereinafter “Ergun at ___”).

The preceding discussion of Resasco accompanying the anticipation *supra* is expressly incorporated herein by reference. To the extent Resasco *may* not recite the void ratios of Claims 7 and 31 *in haec verba*, this does not impart patentability. Resasco makes mention of a fluidized bed reactor. *See e.g.* (Resasco 12: 47-48). Furthermore, Resasco explicitly recites variables that affect the nanotube/nanofiber yield. Resasco states:

For example, the yield of nanotubes is affected by the catalyst formulation (e.g., transition metal ratio, type of support, and metal loading), *by the operating parameters* (e.g., reaction temperature, catalytic gas pressure, space velocity and reaction time), and by pretreatment conditions (e.g., reduction and calcination).

(Resasco 3: 59-64) (emphasis added). Thus, there is a very clear, explicit teaching of the result-effective variables in the Resasco process. Void fraction (i.e. the “empty space” in the catalyst bed) is closely intertwined pressure, space velocity and reaction time. This teaching is reflected

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in the literature. *See e.g.* (Ergun at 1182 *et seq.*) (noting the relationship between void volume and flow rate). Optimizing this, especially when Resasco teaches that it effects yield, is well within the level of skill in the art (which as noted above, was a skilled chemist or chemical engineer).

Claims 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,413,487 to Resasco, et al. as applied to claims 1 above, and further in view of US 6,645,455 to Margrave, et al.

The preceding discussion of Resasco accompanying the anticipation rejection *supra* is expressly incorporated herein by reference. With respect to Claims 15-18, notwithstanding the ambiguities noted above, to the extent Resasco may not teach whatever is being claimed, Margrave teaches the compounds claimed. *See* (Margrave 7: 50 *et seq.*). One would be motivated to use such compounds, because they make nanotubes. *See Id.*

Conclusion

Candidly speaking, if there is anything patentably distinct, it has been “lost in translation.” Proper idiomatic English is expected in the Claims and the Specification is expected in reply to this office action. All amendments made in response to this Office Action must be accompanied by a pinpoint citation to the Specification (i.e. page and paragraph or line number) to indicate where Applicants are drawing their support.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANIEL C. MCCracken whose telephone number is

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(571)272-6537. The examiner can normally be reached on Monday through Friday, 9 AM - 6 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley S. Silverman can be reached on (571) 272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Daniel C. McCracken/
Daniel C. McCracken
Examiner, Art Unit 1793
DCM

/Stuart Hendrickson/
Stuart L. Hendrickson
Primary Examiner